Changing Eating Habits in College Students Through "Veggies First" and "Chocolate Last" Dietary Interventions

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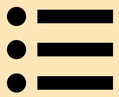
Background

Diets high in fat and calories and low in vegetables may play a role in the increasing prevalence of chronic disease in Americans in recent years. However, the average American consumes 3,800 calories daily and only 1.5 servings of vegetables[1]. Interventions are needed to increase vegetable intake and decrease fat and calorie consumption.

Preliminary research has demonstrated that presenting vegetables in isolation before a main meal, rather than alongside preferred foods, has the ability to increase vegetable intake. This eating strategy, referred to as Veggies First (VF), has been successful in increasing vegetable consumption in elementary school children during cafeteria lunchtimes[2].

Studies have shown that eating larger portion sizes do not reduce feelings of hunger or food cravings. The average snack size can be cut in half and will still achieve the same perceived satiation[3]. An innovative use of smaller portion sizes may be to use a small snack to signal the end of every meal in order to reduce daily calories, an eating strategy known as Chocolate Last (CL).



Food provisions and structured meal plans may increase adherence to dietary interventions by reducing the time and effort needed for weight loss monitoring and establishing a healthy routine[4]. Providing a strategy to achieve a dietary goal may be more beneficial than no strategy.

Purpose

- To combine the eating strategies of VF, CL, and food provision/structured meal plans to both increase vegetable intake and to reduce total calorie and fat consumption as well as increase adherence to habit forming treatment.
- To show that VF, CL, and food provision/structured meal plans are effective strategies among college students.
- To test three hypotheses:
  1) Vegetable intake will increase for those exposed to VF and the combined intervention Veggies First and Chocolate Last (VFCL)
  2) Fat and calorie consumption will decrease in those exposed to VF and VFCL with larger declines seen in the VFCL condition
  3) Greater compliance to increase vegetable consumption in the VF and VFCL conditions than the No Strategy (NS) condition

Materials and Methods

Study 1: Eighteen female undergraduate students in a freshmen seminar recorded their food intake on the food diary application Lose It! for three weeks. During Week 1 of the study, the professor instructed her students to record their weekly eating without changing their food consumption. Week 1 acted as a baseline for the participants' vegetable and calorie consumption. For Week 2 and 3, the participants were taught the VF strategy and were instructed to eat vegetables first in isolation before lunch or dinner. They were not explicitly told to increase their vegetable consumption or to decrease their calorie consumption.

Study 2: Twenty five college students recorded their food intake on the food diary application Lose It! for three weeks. Participants were randomly assigned to one of the three eating strategies, VF, VFCL, or NS, to be followed during Week 2 and 3 of the study. Research assistants taught participants how to use Lose It! and gave those in the VFCL condition a cardboard box containing 20 Dove® Chocolates to eat at the end of each lunch and dinner meal during Week 2 and 3.

During Week 1, all participants recorded normal food intake to establish a baseline of vegetable, calorie, and macronutrient consumption. During Week 2 and 3, participants were e-mailed condition specific reminders and instructions based on their assigned eating strategy. At the end of the study, after the participants submitted their third and final set of weekly food reports, final questionnaire and debriefing documents were sent via e-mail.

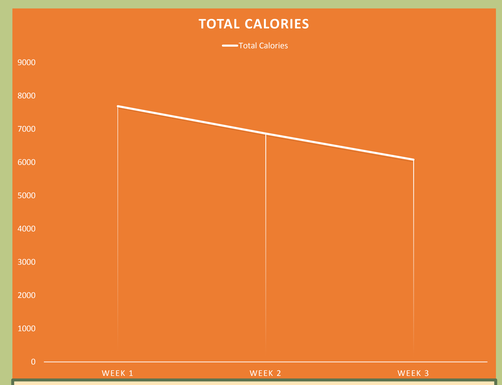
Results

Study 1: First, we compared the change in vegetable servings between baseline and the VF intervention. A paired-samples t-test was conducted to compare vegetable servings between baseline and the VF intervention. There was a significant difference between baseline vegetable servings (M = 4.28, SD = 3.51) and VF intervention vegetable servings (M = 6.78, SD = 3.57); t(17) = -3.04, p = .007. Second, we compared the change in total calories between baseline and the VF intervention. A paired-samples t-test was conducted to compare total calories between baseline and the VF intervention. There was a signification difference between baseline total calories (M = 7686.9, SD = 2117.9) and VF intervention total calories (M = 6471.9, SD = 1939.9); t(17) = 3.86, p = .001.

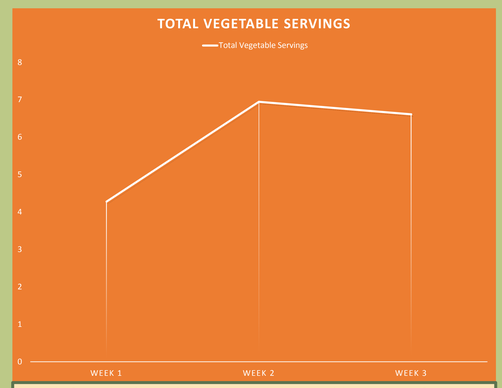
Study 2: First, we compared the differences between Week 1 and Week 2 vegetable servings across conditions. A one-way between subjects ANOVA was conducted to compare the effect of interventions on vegetable servings in the NS (M = 2.28, SE = 1.47), VF (M = 2.36, SE = 1.23), and VFCL (M = 2.87, SE = 1.38) conditions. There was not a significant effect of intervention on vegetable servings for the three conditions [F(2, 22) = .055, p = .947]. Second, we compared the differences between Week 1 and Week 2 total calories across conditions. A one-way between subjects ANOVA was conducted to compare the effect of interventions on total calories in the NS (M = 925, SE = 1162), VF (M = -738, SE = 972), and VFCL (M = -1595, SE = 1087) conditions. There was not a significant effect of intervention on total calories for the three conditions [F(2, 22) = 1.287, p = .296]. It should be noted that only 25 participants have successfully completed Study 2 and results are preliminary.

Conclusion

Veggies First may be a promising dietary strategy to encourage college students to increase vegetable intake and reduce calorie consumption. Based on Study 1, college students were successful at eating more vegetables when following the dietary intervention than during their normal eating routine. As an added effect, Veggies First also contributed to a decline in total weekly calories without asking students to manage their calorie consumption. However, it is important to mention that the results from Study 2 do not confirm these findings. Although Study 2 employs a between subjects rather than a within subjects design and introduces a new condition, Veggies First Chocolate Last, we would expect participants in the Veggies First conditions to replicate similar eating patterns to the participants in Study 1. An explanation for this discrepancy may lie in the small sample size of Study 2 and the subsequent variance between groups. With a larger sample size we hope to increase homogeneity of groups and reproduce the increase in vegetable servings and decrease in total calories seen in Study 1. These results would have implications for cost-effective public health initiatives designed to promote healthier eating on college campuses.



Graph from Study 1 of the mean total calories from week 1 baseline and week 2 and 3 of the Veggies First intervention.



Graph from Study 1 of the mean total vegetable servings from week 1 baseline and week 2 and 3 of the Veggies First intervention.

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